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| Mr. Michael T. Davis<br>WLPCS Pre-Calculus | Unit 2.9 Rational Functions Quiz<br>March 6, 2018 |

Name: Answers / Solutions

**Directions for # 1-4: For each rational function:**

1. **Identify an equation for each vertical asymptote (VA), if any exist.**
2. **Identify an equation for each horizontal asymptote (HA), if any exist.**
3. **Identify the coordinates of all x-intercepts, if any exist.**
4. **Identify the coordinates of a y-intercept, if one exists.**
5. **Identify any value of x for which the graph has a hole.**
6. **Draw a neat and accurate graph of the function.**

1. (8 pts) $f(x)=\frac{8}{x-2}$

| X | Y |
|---|---|
| 6 | 2 |

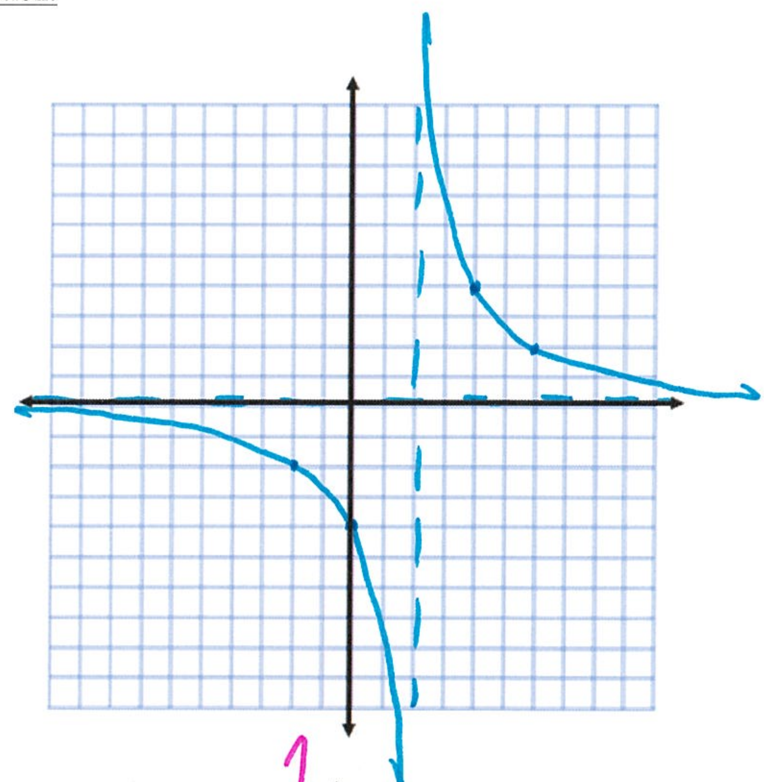
VA: $x=2$

HA: $y=0$

X-Intercept(s): None

Y-Intercept: $(0,-4)$

X-Value of Hole: None



2. (8 pts) $f(x)=\frac{x-4}{x+1}$

| X | Y |
|---|---|
| 1 | $-\frac{3}{2}$ |

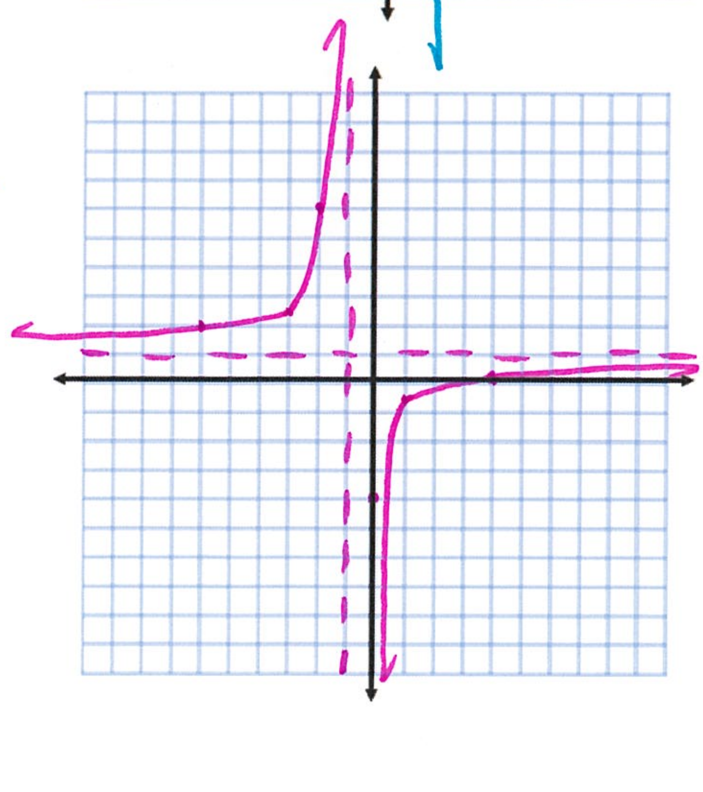
VA: $x=-1$

HA: $y=1$

X-Intercept(s): $(4,0)$

Y-Intercept: $(0,-4)$

X-Value of Hole: None



3. (8 pts) $f(x)=\dfrac{x^2-5x+6}{x-3}$ or $f(x)=\dfrac{(x-3)(x-2)}{x-3}$

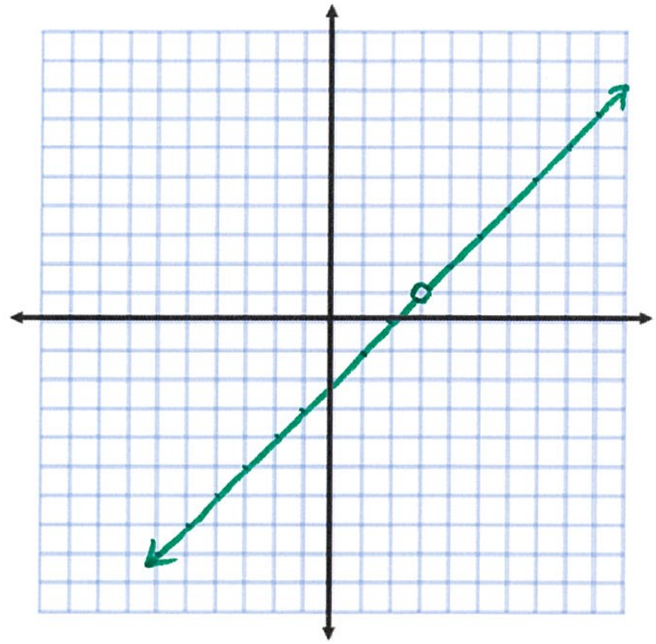
VA: None

HA: None

X-Intercept(s): (2, 0)

Y-Intercept: (0, -2)

X-Value of Hole: x = 3



4. (8 pts) $f(x)=\dfrac{x+2}{x^2+x-2}$ or $f(x)=\dfrac{x+2}{(x+2)(x-1)}$

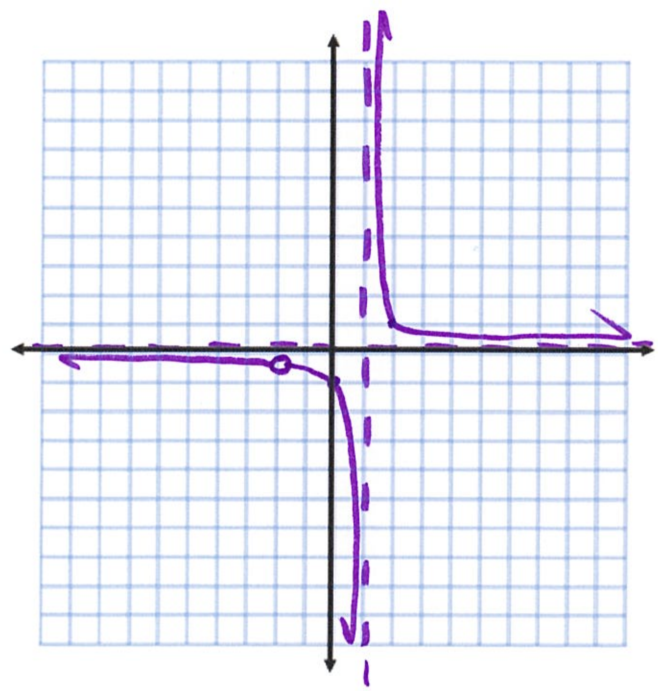
VA: x = 1

HA: y = 0

X-Intercept(s): None

Y-Intercept: (0, -1)

X-Value of Hole: x = -2



**Directions for #'s 5-11: Multiple Choice**

5. (4 pts) The rational function $f\left(x\right)=\dfrac{x^2-9}{x^2-4x-21}$ has the following domain:

   a. $D:\mathbb{R}, x\neq -3, x\neq 3$
   b. $D:\mathbb{R}, x\neq -7, x\neq 3$
   c. $D:\mathbb{R}, x\neq -3, x\neq 7$
   d. $D:\mathbb{R}, x\neq -21, x\neq -4$
   e. $D:\mathbb{R}$

6. (4 pts) The rational function $f\left(x\right)=\dfrac{x-8}{x^2-25}$ has an x-intercept with coordinates:

   a. $\left(0,8\right)$
   b. $\left(5,0\right)$
   c. $\left(8,0\right)$
   d. $\left(0,\dfrac{8}{25}\right)$
   e. There is no x-intercept

7. (4 pts) The rational function $f\left(x\right)=\dfrac{10}{x^2-4}$ has a horizontal asymptote with equation:

   a. $y=0$
   b. $x=2$
   c. $y=10$
   d. $x=-2$ & $x=2$
   e. There is no horizontal asymptote

8. (4 pts) The rational function $f\left(x\right)=\dfrac{x^2-8x+16}{x^2-16}$ has a hole at:

   $f(x) = \dfrac{(x-4)(x-4)}{(x-4)(x+4)}$

   a. $y=-1$
   b. $y=1$
   c. $x=-4$
   d. $x=4$
   e. There is no hole

9. (4 pts) The rational function $f(x)=\dfrac{x-8}{x^2-16}$ has a y-intercept with coordinates:

a. $(8,0)$

b. $(0,2)$

c. $(0,8)$

d. $\left(0,\dfrac{1}{2}\right)$

e. There is no y-intercept

10. (4 pts) The rational function $f(x)=\dfrac{x^2-9x+14}{x^2+4x-12}$ has an x-intercept(s) with coordinates:

$f(x) = \dfrac{(x-7)(x-2)}{(x+6)(x-2)}$

a. $(2,0)$ & $(-6,0)$

b. $(7,0)$ only

c. $(2,0)$ only

d. $(2,0)$ & $(7,0)$

e. There is no x-intercept

11. (4 pts) The rational function $f(x)=\dfrac{6x^2+3x-1}{2x^2-18}$ has a horizontal asymptote with equation:

a. $y=6$

b. $x=3$

c. $y=0$

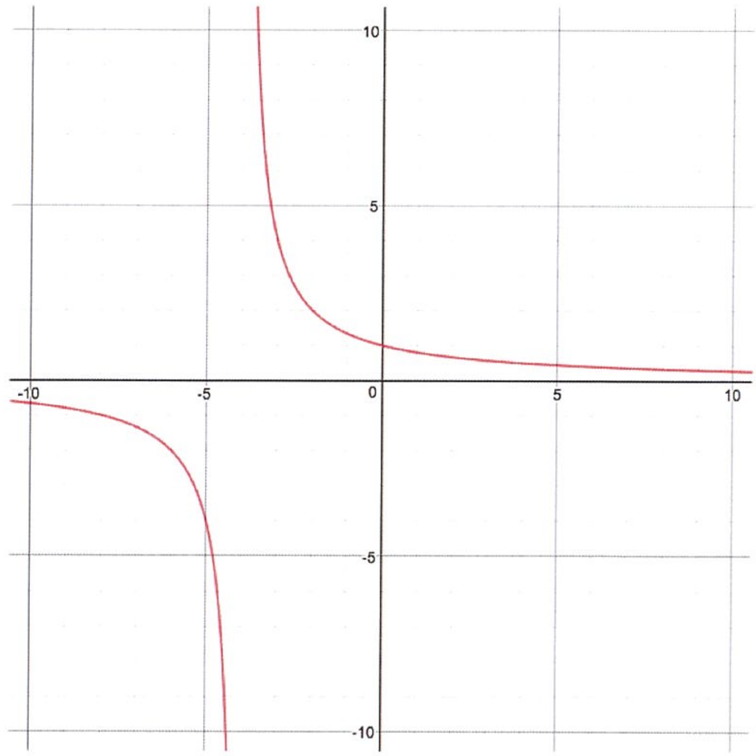
d. $y=3$

e. None of the above

**Directions for # 12-16: For each rational function:**

1. **Identify an equation for each vertical asymptote (VA), if any exist.**
2. **Identify an equation for each horizontal asymptote (HA), if any exist.**
3. **Identify the coordinates of all x-intercepts, if any exist.**
4. **Identify the coordinates of a y-intercept, if one exists.**
5. **Identify any value of x for which the graph has a hole.**
6. **Write an equation for the rational function.**

12. (8 pts)




VA: $x=-4$

HA: $y=0$

X-Intercept(s): None

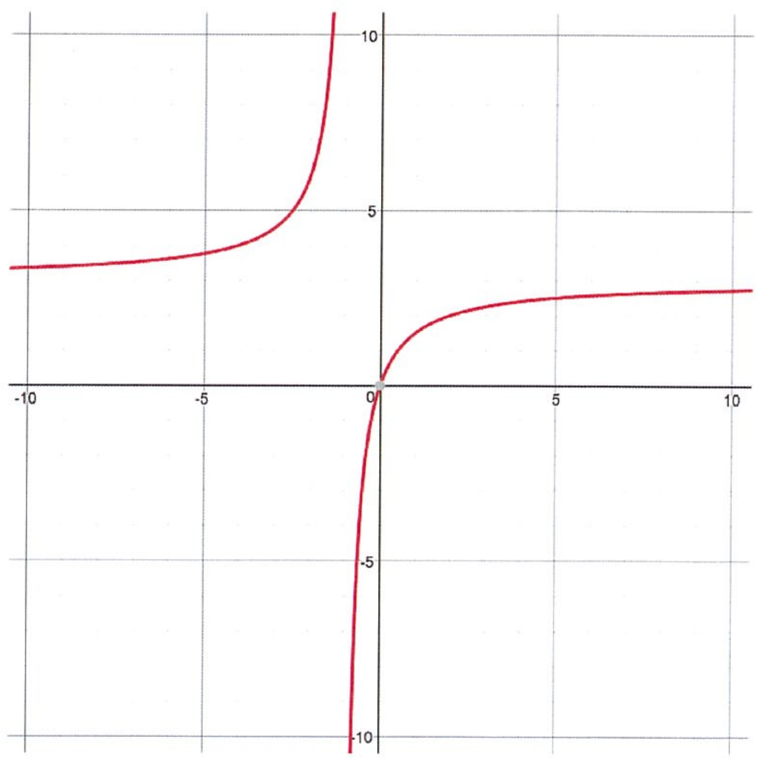
Y-Intercept: $(0,1)$

X-Value of Hole: None

Equation:

$$f(x)=\frac{4}{x+4}$$

13. (8 pts)




VA: $x=-1$

HA: $y=3$

X-Intercept(s): $(0,0)$

Y-Intercept: $(0,0)$

X-Value of Hole: None

Equation:

$$g(x)=\frac{3x}{x+1}$$

14. (8 pts)

VA: $x = -2$

HA: $y = 2$

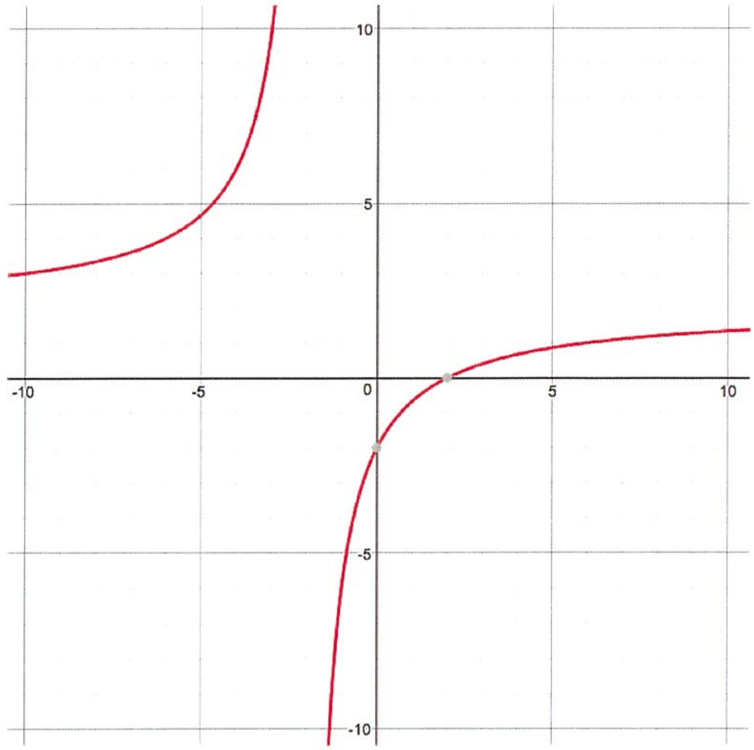
X-Intercept(s): $(2, 0)$

Y-Intercept: $(0, -2)$

X-Value of Hole: None

Equation:

$$P(x) = \frac{2(x-2)}{x+2}$$




15. (8 pts)

VA: None

HA: None

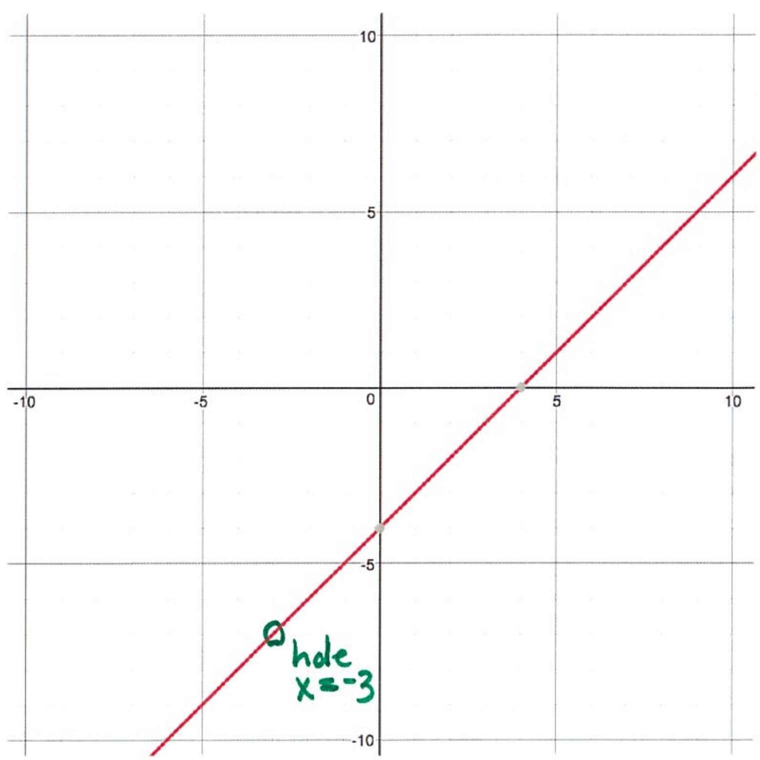
X-Intercept(s): $(4, 0)$

Y-Intercept: $(0, -4)$

X-Value of Hole: $x = -3$

Equation:

$$T(x) = \frac{(x+3)(x-4)}{(x+3)}$$



16. (8 pts)

VA: $x = -1$

HA: $y = 0$

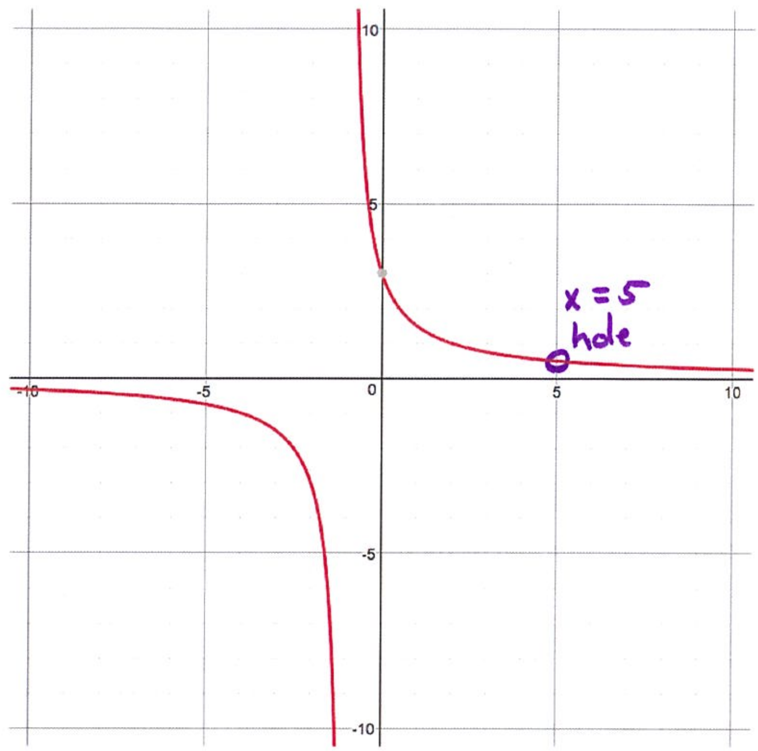
X-Intercept(s): None

Y-Intercept: $(0, 3)$

X-Value of Hole: $x = 5$

Equation:

$$K(x) = \frac{3(x-5)}{(x-5)(x+1)}$$



**Optional Extra Credit**

A. (8 pts) $f(x)=\dfrac{3x^2-3}{x^2+2x-3}=\dfrac{3(x-1)(x+1)}{(x+3)(x-1)}$

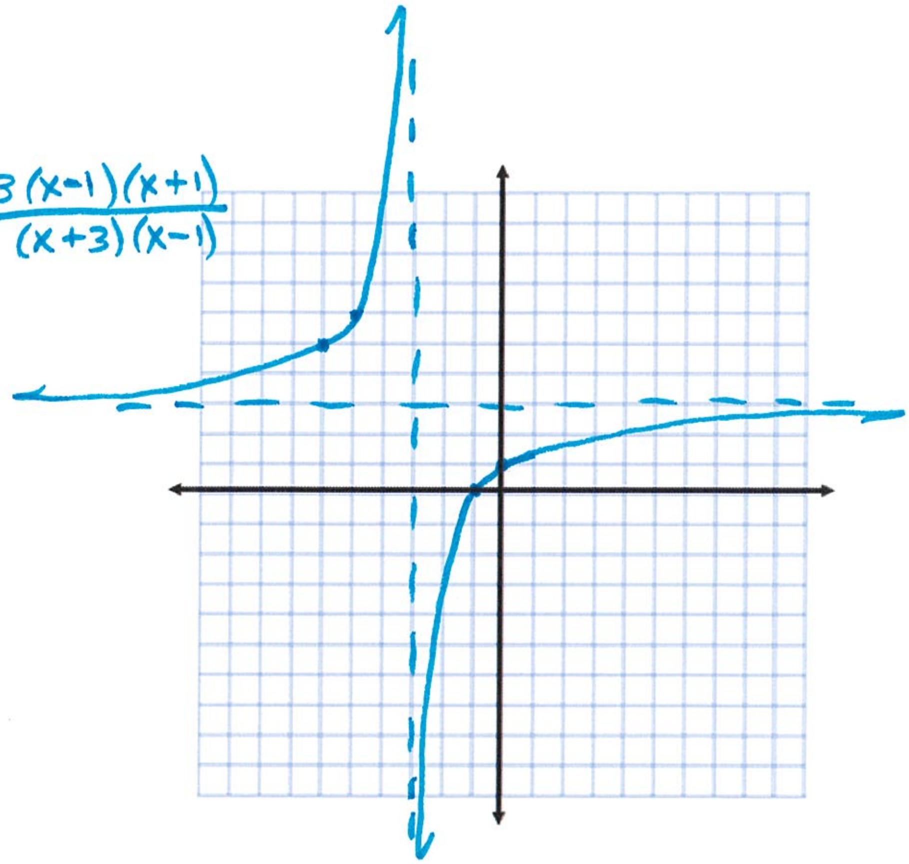
VA: $x=-3$

HA: $y=3$

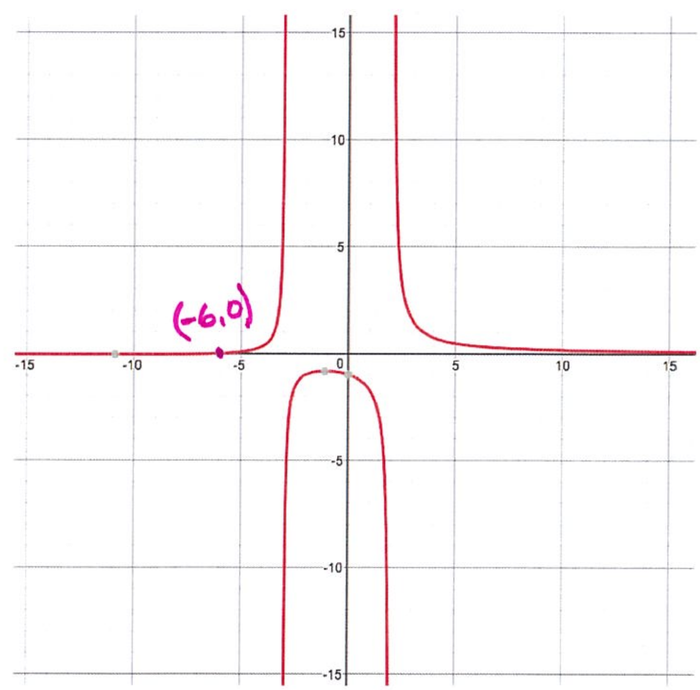
X-Intercept(s): $(-1,0)$

Y-Intercept: $(0,1)$

X-Value of Hole: $x=1$



B. (8 pts)




VA: $x=2$ and $x=-3$

HA: $y=0$

X-Intercept(s): $(-6,0)$

Y-Intercept: $(0,-1)$

X-Value of Hole: None

Equation:

$$f(x)=\frac{x+6}{(x-2)(x+3)}$$